



MALAHAYATI INTERNATIONAL JOURNAL
OF NURSING AND HEALTH SCIENCE
ISSN 2620-9152 (Print)
ISSN 2621-4083 (Online)
DOI: 10.33024



ARTICLE INFORMATION

Received: October, 6, 2024

Revised: March, 22, 2025

Available online: March, 23, 2025

at : <https://e-jurnal.iphorr.com/index.php/minh>

The effect of core stability exercise and functional ability for prevention of recurrences of low-back pain in patients with herniated nucleus pulposus

Nursaputri*, WahyuTri Sudaryanto

Program Studi Fisioterapi, Fakultas Ilmu Kesehatan, Universitas Muhammadiyah Surakarta

Corresponding author: *E-mail: putrinursa01@gmail.com

Background: An intervertebral disc's nucleus pulposus or annulus fibrosus may protrude in part or in its entirety in a condition known as herniated nucleus pulposus (HNP). This can put pressure on the spinal canal or nerve roots through the annulus fibrosus's tear. Over 90% of HNP instances take place in the disc between the L4-L5 lumbar vertebrae or the L5-S1 sacral vertebrae, which is the disc between the fourth and fifth lumbar (L4-L5) vertebrae, which means that pressure is exerted on the L4, L5 and S1 nerves, causing local low back pain and radicular pain in the lower limbs, especially in the back of the lower leg and in the back of the foot.

Purpose: To determine the effect of core stability exercise on reducing pain and increasing functional ability in LBP EC HNP patients.

Method: A quantitative research method in the form of Quasy Experimental with a Two Group Pretest-Posttest design, namely a control group and a group of 20 respondents who experienced LBP EC HNP. The research instrument uses the ODI questionnaire and Visual Analog Scale (VAS). The data obtained were then analyzed using the Wilcoxon test and the Mann Whitney test.

Results: There is a difference in the influence of ODI and Motion Pain between group 1 control and group 2 treatment ($p < 0.05$). While in the pressure pain value ($p > 0.05$) then the decision was taken to fail to reject H_0 which means there is no difference in the influence of pressure pain between group 1 control and group 2 treatment.

Conclusion: There is an effect of Core Stability Exercise on reducing pain and increasing the ability of functional activities of daily living in patients with Lumbar Hernia Nucleus Pulposus.

Keywords: Core Stability Exercise; Functional Ability; Hernia Nucleus Pulposus; Low Back Pain.

INTRODUCTION

Lower Back Pain or often called Low back pain (LBP) is a complaint that is often encountered in everyday practice. 84% of people on the whole world have at least one episode of LBP in their lifetime, per global research. LBP is the second most common symptom after upper respiratory tract disorders and is the reason someone visits a doctor. LBP is a symptom associated with more than 60 medical conditions (Nasikhatussoraya, Octaviani, & Julianti, 2016; Hartvigsen, Hancock, Kongsted, Louw, Ferreira, Genevay, & Woolf, 2018).

The prevalence of lower back pain continues to increase and every year is most often found in

people aged 35 to 55 years, basic health research in 2018 stated that the prevalence of musculoskeletal disease according to the diagnosis made by Indonesian medical personnel was 7.3% (Ministry of Health of the Republic of Indonesia, 2020). The number of people suffering from lower back pain in Indonesia is not yet known for certain but is estimated to range from 7.6% to 37% (Satriadi, Fitriangga, Zakiah, & Rahmayanti, 2018).

Factors that can influence the development of low back pain (LBP) include the habit of sitting for a long time or certain diseases such as falls that cause a fracture of the nucleus pulposus in the lumbar

The effect of core stability exercise and functional ability for prevention of recurrences of low-back pain in patients with herniated nucleus pulposus

spine (Wong, 2017; Madabane, 2017; Praveen, 2020). An intervertebral disc's nucleus pulposus or annulus fibrosus may protrude in part or in its entirety in a condition known as herniated nucleus pulposus (HNP). This can put pressure on the spinal canal or nerve roots through the annulus fibrosus's tear (Foster, 2017; El Melhat, Youssef, Zebdawi, Hafez, Khalil, & Harrison, 2024). More than 90% of HNP cases occur in the disc between the fourth and fifth lumbar vertebrae (L4-L5) or the fifth lumbar vertebra and the sacral spine (L5-S1) (Donnally & Dulebohn, 2017). This means that there is pressure on the L4, L5, and S1 nerves, causing radicular pain in the lower leg and local low back pain, especially in the back of the lower leg and the back of the sole of the foot. Problems that may arise include disruption of daily activities, inability to work in the field of expertise, and not being able to enjoy free time due to pain during rest (Beatty, 2018).

Services that aim to restore and restore a person's movement and function so that a healthy state can be achieved are physiotherapy. Some physiotherapy techniques that can be used to help alleviate discomfort and enhance functioning following a diagnosis of low back pain et causa hernia, or Nucleus Pulposus, are workouts for core stability (Rohmah, 2018; Khalid, Sarwar, Sarwar, & Sarwar, 2015).

Exercises for improving neuromuscular control and spine protection are called core stability exercises. Enhancing control in the lumbopelvic region is the aim of this exercise. Enhancing the lumbopelvic muscles' control and coordination, as well as fortifying them, are the two methods by which they can be made larger. Exercises for core stability are predicated on spinal stability based on muscle contribution. Stated differently, muscle contraction is required to keep the spine in its proper posture (Pramita, Pangkahila, & Sugijanto, 2014). Previous studies have shown that core stability exercise is beneficial for those suffering from Hernia Nucleus Pulposus (Tantangan, Bintang, & Ginting, 2021). However, some have also shown that there is no significant difference between before and after core

stability exercise in patients with low back pain (Hasmar, & Faridah, 2022). Other studies have shown that core stability exercise and reinforcement exercise (STE) are equally effective for patients with low back pain (Hlaing, Puntumetakul, Khine, & Boucaut, 2021). Core stability exercise and PNF showed an increase in pain and an increase in functional ability (Areeudomwong, & Butttagat, 2019).

RESEARCH METHOD

In this study, a control group and a treatment group are part of a two-group pretest-posttest quasi-experimental research design that employs quantitative research methodology. Furthermore, individuals with LBP et causa HNP will be enrolled to find out how core stability exercises affect pain and functional abilities. In this design, there is one intervention treatment group that is not randomly selected by being given an intervention in the form of core stability exercise. And one intervention and education control group that is not randomly selected by being given an intervention in the form of core stability exercise and education.

This study uses primary data by meeting respondents directly. The study was conducted from June 3 to June 21, 2024 at the dr. Soedjono Army Hospital, Magelang. All of the study participants were hospital patients. The sample was selected based on inclusion and exclusion criteria and then selected using purposive sampling to determine the treatment group and control group. 10 persons are the sample quantity for each group. So that the total sample of this study is 20 people.

Physiotherapy examinations include, pain examinations using the Visual Analog Scale (VAS), and functional ability examinations using the Oswestery Disability Index (ODI). The Wilcoxon and Mann Whitney tests will be used to assess the outcomes following the assessment and physiotherapy session.

This research has obtained an Ethical Clearance letter from the Head of the Research Ethics Committee of the Level II Hospital, dr. Soedjono Magelang with the number: 917/EC/V/2024.

Nursaputri*, WahyuTri Sudaryanto

Program Studi Fisioterapi, Fakultas Ilmu Kesehatan, Universitas Muhammadiyah Surakarta
Corresponding author: *E-mail: putrinursa01@gmail.com

DOI: <https://doi.org/10.33024/minh.v8i1.749>

RESEARCH RESULTS

Table 1. Characteristics of the Participants (N=20)

Variable	Results
Age (Mean±SD)(Range)(Year)	(55.0=10.708)(30-72)
Age (n/%)	
26-35	1/5.0
36-45	3/15.0
46-55	4/20.0
55-65	8/40.0
>65	4/20.0
Gender (n/%)	
Male	6/30.0
Female	14/70.0

Table 1 shows the age of participants with mean and standard deviation (55.0=10.708) with an age range between 30 to 72 years. The majority were female, 14 (70%). The results of the analysis showed that the majority were in the age range of 55–65 years and female gender was more dominant in cases of HNP EC Low Back Pain.

Table 2. Wilcoxon Test Results

Group	Control		Treatment	
	Z	Sig.	Z	Sig.
Pre-posttest ODI	-2.809 ^c	.005	-2.829 ^c	.005
Pre-posttest Pressure Pain	-2.820 ^c	.005	-2.831 ^c	.005
Pre-posttest Movement pain	-2.825 ^c	.005	-2.859 ^c	.004

Based on the control group output, in the ranking table it can be seen that all indicators have negative rankings which means the pre value is higher than the post or there is a decrease in ranking. It is known that the z test statistics on the three indicators are -2.809, -2.820, and -2.825 with significance values of 0.005, 0.005, and 0.005. In this test, if the significance value is smaller than the significance level ($\alpha = 0.05$) then it is decided that H0 is rejected. In order to conclude that there is a significant difference between the pre and post values on ODI, Tenderness, and Motion Pain in the control group, it was decided to reject H0 because it is known that the three indicators have significance values smaller than the significance level.

All indicators have negative ratings, indicating that the value before is higher than the value after or the ranking decreases, according to the ranking table based on the group treatment output. The z-test statistics of the three indicators are known to be -2.829, -2.831, and -2.859, with significance levels of 0.005, 0.005, and 0.004, respectively. When the significance value of the test is smaller than the predetermined significance level ($\alpha = 0.05$), the hypothesis is rejected.

The decision was made to reject H0 in order to draw a conclusion that there is a significant difference between the values before and after ODI, tenderness, and motion pain in the group treatment because it is known that the three indicators have significance values smaller than the significance level. Therefore, it can be said that both the control group and the group that received treatment including core stability exercise interventions have an impact on reducing the degree of pain experienced by LBP EC HNP patients.

Nursaputri*, WahyuTri Sudaryanto

Program Studi Fisioterapi, Fakultas Ilmu Kesehatan, Universitas Muhammadiyah Surakarta
Corresponding author: *E-mail: putrinursa01@gmail.com

DOI: <https://doi.org/10.33024/minh.v8i1.749>

The effect of core stability exercise and functional ability for prevention of recurrences of low-back pain in patients with herniated nucleus pulposus

Table 5. Mann Whitney U Test Results for Control and Treatment Groups

	ODI	Pressure Pain	Movement Pain
Mann-Whitney U	21.000	31.500	14.000
Sig.	.029 ^b	.165 ^b	.005 ^b

The results of the study showed that the Mann Whitney U test statistic for the ODI variable was 21 with a significance value of 0.029; the Mann Whitney U test statistic for the pain pressure variable was 31.5 with a significance value of 0.165; and the Mann Whitney U test statistic for the pain movement variable was 14 with a significance value of 0.005. In this test, if the significance value is smaller than the significance level ($\alpha = 0.05$) then H_0 is decided to be rejected.

It was decided to reject H_0 so that it can be concluded that there is a significant difference in ODI and pain movement between the control group and the treatment group because it is known that the ODI and pain movement variables have a significance value smaller than the significance level. The choice taken is not to reject H_0 which shows that there is no significant difference in pain pressure between the control group and the treatment group, even though pain pressure has a significance value greater than the significance level.

DISCUSSION

Participant characteristics, namely age, showed that the age of 55-65 years was more dominant than other ages. As age increases, degeneration occurs in the form of tissue damage, tissue replacement in scar tissue, and fluid loss. This reduces the stability of bones and muscles. The older a person is, the higher the risk of decreased bone elasticity which causes low back pain (Masaki, Ikezoe, Yanase, Ji, Umehara, Aoyama, & Ichihashi, 2019).

Gender characteristics in the control group and treatment group showed that women were more dominant than men in cases of Low Back Pain EC HNP. This is in accordance with previous research showing that the prevalence of low back pain is more felt by women than men (Andini, 2015).

This is because women's muscle capacity is lower than men. In women, these symptoms often occur during the menstrual cycle. In addition, the

menopause process can also cause decreased bone density due to decreased estrogen hormone which can cause back pain. Gender has a major influence on the risk of musculoskeletal disorders. This happens physiologically, women's muscle capacity is lower than men.

After 6 sessions of physiotherapy using this modality, there was a decrease in pressure pain and movement pain which was evaluated using VAS in both groups.

The Wilcoxon test results demonstrated that following the pre- and post-test core stability exercises, each respondent in the treatment group and the control group experienced a reduction in motion discomfort, a decrease in pressure pain, and an increase in functional capacity. This is because Core Stability Exercise causes muscles to contract and relax, thereby reducing spasms/cramps. Body tissue, especially muscle tissue, is composed of fine fibers (myofibrils) that often stick together (cross-link) when in a state of spasm. If you move directly in such a state, it is likely to damage the crosslink. To loosen adhesions after warming up and further stretching. In addition, muscles can perform movements that require stretching, joints become loose, ready to perform harder movements and require maximum movement.

Performing core stability exercises improves functional activity by increasing core stability and preventing back injuries. Lower back pain can arise from weak or unbalanced core muscles (muscle imbalance). Since the lower trunk muscles are coactive, core stability exercises enhance the balance of the abdominal and paravertebral muscles, allowing them to control movement during weight transfer and functional activities of the extremities such as grasping and stepping. This is in accordance with research conducted at Haji Darjad Hospital, Samarinda, which shows how core stability affects LBP EC HNP patients at Haji Darjad Hospital by decreasing pain and improving lower back functional ability (Aco & Sulfandi, 2022).

Nursaputri*, WahyuTri Sudaryanto

Program Studi Fisioterapi, Fakultas Ilmu Kesehatan, Universitas Muhammadiyah Surakarta
Corresponding author: *E-mail: putrinursa01@gmail.com

DOI: <https://doi.org/10.33024/minh.v8i1.749>

The effect of core stability exercise and functional ability for prevention of recurrences of low-back pain in patients with herniated nucleus pulposus

Meanwhile, the results of the Mann Whitney U test to determine the difference in influence between the two groups are known ODI and Motion pain variables have a significance value smaller than the significance level, so the decision is taken to reject H0 so that it can be concluded that there is a significant difference in ODI and Motion pain between the control group and the treatment group. While pressure pain has a significance value greater than the significance level, so the decision is taken to fail to reject H0 which means that there is no significant difference in pressure pain between the control and treatment groups.

CONCLUSION

The core stability exercises which were assessed using VAS and ODI questionnaires, have an impact on lumbar hernia nucleus pulposus patients at the dr. Soedjono Army Hospital, Magelang by decreasing pain and improving their ability to perform functional activities on a daily basis.

REFERENCES

Aco, A., & Sulfandi, W. D. C. (2022). Pengaruh Core Stability Exercise Terhadap Perubahan Nyeri Dan Functional Activity Daily Living Pada Pasien Hernia Nucleus Pulposus Lumbalis Di Rs. Haji Darjad Samarinda. *Physio Res Cent*, 2(1), 7-12.

Andini, F. (2015). Risk factors of low back pain in workers. *J majority*, 4(1), 12-19.

Areeudomwong, P., & Buttagat, V. (2019). Comparison of core stabilisation exercise and proprioceptive neuromuscular facilitation training on pain-related and neuromuscular response outcomes for chronic low back pain: a randomised controlled trial. *The Malaysian journal of medical sciences: MJMS*, 26(6), 77.

Beatty, S. (2018). We need to talk about lumbar total disc replacement. *International Journal of Spine Surgery*, 12(2), 201-240.

Donnally III, C. J., & Dulebohn, S. C. (2017). Lumbar degenerative disk disease. *Treasure Island: StatPearls Publishing*.

Foster, M. R. (2017). *Herniated Nucleus Pulposus* Medscape.

Hartvigsen, J., Hancock, M. J., Kongsted, A., Louw, Q., Ferreira, M. L., Genevay, S., & Woolf, A. (2018). What low back pain is and why we need to pay attention. *The Lancet*, 391(10137), 2356-2367.

Hasmar, W., & Faridah, F. (2022). E-book core stability exercise on myogenic low back pain. *Indonesian Journal of Sport Management and Physical Education*, 1(1), 1-10.

Hlaing, S. S., Puntumetakul, R., Khine, E. E., & Boucaut, R. (2021). Effects of core stabilization exercise and strengthening exercise on proprioception, balance, muscle thickness and pain related outcomes in patients with subacute nonspecific low back pain: a randomized controlled trial. *BMC musculoskeletal disorders*, 22, 1-13.

Khalid, M. T., Sarwar, M. F., Sarwar, M. H., & Sarwar, M. (2015). Current role of physiotherapy in response to changing healthcare needs of the society. *International Journal of Education and Information Technology*, 1(3), 105-110.

Madabane, T. K. Z. (2017). Examining Risk Factors Associated with Lower Back Pain (LBP) in Drivers/Operators of Articulated Vehicles (DAVs) and Non-Davs, in Ngqura Container Terminal, Eastern Cape (Master's thesis, University of Johannesburg (South Africa)).

Masaki, M., Ikezoe, T., Yanase, K., Ji, X., Umehara, J., Aoyama, J., & Ichihashi, N. (2019). Association of pain history and current pain with sagittal spinal alignment and muscle stiffness and muscle mass of the back muscles in middle-aged and elderly women. *Clinical spine surgery*, 32(7), E346-E352.

Nursaputri*, WahyuTri Sudaryanto

Program Studi Fisioterapi, Fakultas Ilmu Kesehatan, Universitas Muhammadiyah Surakarta
Corresponding author: *E-mail: putrinursa01@gmail.com

DOI: <https://doi.org/10.33024/minh.v8i1.749>

The effect of core stability exercise and functional ability for prevention of recurrences of low-back pain in patients with herniated nucleus pulposus

- El Melhat, A. M., Youssef, A. S., Zebdawi, M. R., Hafez, M. A., Khalil, L. H., & Harrison, D. E. (2024). Non-surgical approaches to the management of lumbar disc herniation associated with radiculopathy: a narrative review. *Journal of clinical medicine*, 13(4), 974.
- Ministry of Health of the Republic of Indonesia. (2020). *Laporan Nasional Riskesdas 2018*. Lembaga Penerbit Badan Penelitian dan Pengembangan Kesehatan, Jakarta. ISBN 978-602-373-118-3. Accessed from: <https://repository.badankebijakan.kemkes.go.id/id/eprint/3514/>
- Nasikhatussoraya, N., Octaviani, R. V., & Julianti, H. P. (2016). Hubungan intensitas nyeri dan disabilitas aktivitas sehari-hari dengan kualitas hidup: Studi pada pasien hernia nukleus pulposus (HNP) lumbal. *Jurnal Kedokteran Diponegoro (Diponegoro Medical Journal)*, 5(4), 1364-1377.
- Pramita, I., Pangkahila, A., & Sugijanto, S. (2014). Core stability exercise lebih baik meningkatkan aktivitas fungsional daripada william's flexion exercise pada pasien nyeri punggung bawah miogenik. *Universitas Udayana: Denpasar*, 3(1), 35-49.
- Praveen, N. (2020). *Low Back Pain and its Association with Vitamin D Levels in a Tertiary Care Hospital* (Master's thesis, Rajiv Gandhi University of Health Sciences (India)).
- Rohmah, N. (2018). *Diagnosis Dan Tindakan Keperawatan Pada Kasus Orthopedi Dan Traumatologi Berbasis Nursing Intervention Classification*.
- Satriadi, A. A., Fitriangga, A., Zakiah, M., & Rahmayanti, S. (2018). Pengaruh Peregangan terhadap Keluhan Nyeri Punggung Bawah pada Pekerja Bagian Produksi di PT. SDJ Pontianak. *Jurnal Mahasiswa PSAPD FK Universitas Tanjungpura*, 4(2).
- Tantangan, R., Bintang, S. S., & Ginting, S. (2021). Pengaruh Metode Mc Kenzie Exercise dan Core Stability Exercise terhadap Penurunan Nyeri pada Penderita Hernia Nucleus Pulposus. *Jurnal Riset Hesti Medan Akper Kesdam I/BB Medan*, 6(2), 107-111.
- Wong, A. Y. (2017). Low back pain in older adults: risk factors management options and future directions. *Scoliosis and Spinal Disorders*, 12(1), 1-23.

Nursaputri*, WahyuTri Sudaryanto

Program Studi Fisioterapi, Fakultas Ilmu Kesehatan, Universitas Muhammadiyah Surakarta
Corresponding author: *E-mail: putrinursa01@gmail.com

DOI: <https://doi.org/10.33024/minh.v8i1.749>